Kolomoki Mitigation Bank, Spring Creek Mitigation Area

Fifth Year Wetland Monitoring Report

(Quantitative Analysis)

January 2014 through December 2014

Prepared for:

Kolomoki Farm, LLC
Post Office Box 2766
Columbus, Georgia 31902

USACE File Number 200410120

Prepared by:
Consolidated Resources, LLC
2029 5th Avenue, Columbus, GA 31904
Phone: 706-317-5942 Fax: 706-571-0726

KOLOMOKI MITIGATION BANK

SPRING CREEK MITIGATION AREA

Fifth Year Monitoring Report

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES **Appendix A**

I. PROJECT OVERVIEW

ACOE Permit: 200410120

Sponsor: Kolomoki Farm, LLC
706-322-1990
P.O. Box 2766
Columbus, GA 31902

Agent: Stacy Mote, Consolidated Resources, LLC
706-317-5942
2029 5th Avenue
Columbus, GA 31904

The Spring Creek Mitigation Area (SCMA) is located near U.S. Highway 27 approximately 3 miles south of Bluffton, and 8.5 miles north of Blakely, Georgia (31°29'2" latitude and 84°51'40" longitude). North of Jack Slayton Road there are approximately 47 acres of wetlands along Spring Creek that are included in the SCMA as wetland preservation. All enhancement and restoration activities occurred south of Jack Slayton Road (Figure 1, Appendix A). The primary mitigation goal for the SCMA is to restore the original matrix of bottomland hardwood, floodplain forests, cypress/blackgum forests, and streams that existed in the area before the land was managed for agricultural and silvicultural purposes. The primary mitigation action was removal of the dam and culverts on tributaries to Spring Creek, excavation of stream channels on tributaries T1 and T2, planting riparian buffers and wetlands. T3 was allowed to re-develop naturally within the old lakebed. Approximately 186 acres of wetlands were preserved, enhanced, or restored within the Spring Creek project.

Site preparation and dam removal was completed in October 2008. Planting of trees and shrubs was completed in March 2010. Bare root seedlings were planted at a density of 302 trees per acre (based on percentage of each wetland/riparian area planted as per Army Corps of Engineers 2004 Standard Operating Procedures). Recommendations during Y3 monitoring included harrowing the bank boundary twice a year and installing taller PVC poles over several of the t-bars throughout the site. Supplemental planting of 3,000 hardwood saplings occurred during the winter of 2012 to offset incidental mowing impacts during nuisance species removal.

Year 5 monitoring occurred during several periods throughout the year, April 11-12, May 15-16, and October 17-19 (2014), and February 23-24 (2015). Macroinvertebrate collection was conducted in 2015, as approved by the Army Corps of Engineers (ACOE). This allowed for water levels to return to the creek systems.

A site compliance inspection with the Interagency Review Team was conducted on March 11, 2014. During this visit, a beaver dam was observed near the location of the old dam in T3. Ponding of the adjacent wetlands and immediate stream section was observed in proximity to this beaver dam. The bank sponsor removed this dam in April 2014 and continues to perform regular inspections of the area to prevent further issues from arising.

The Year 3 Stream Monitoring report was submitted in April 2014 and the ACOE submitted comments back and requested additional information in June 2015. Consolidated Resources, LLC submitted comments and supplemental information in February 2016 and again

in February 2017 after follow-up with the ACOE. In February 2018, the ACOE requested that the Year 5 report be submitted by mid May of 2018. Specifically, the ACOE would like to see if the Discriminating Macroinvertebrate Scores have improved for T3 during Year 5 Monitoring.

II. REQUIREMENTS

Monitoring

Wetlands

In accordance with the Final BI dated December 22, 2006, documentation of vegetation survival, density, species composition, vegetative growth, hydrology, and evidence of wildlife usage during Years 1, 3, 5, and 7 after mitigation implementation will occur.

Streams

Riparian vegetation monitoring requirements include documentation of vegetation survival, density, species composition, vegetative growth, and evidence of wildlife usage during Years 1, 3, 5, and 7. Macroinvertebrates are to be monitored in Years 1, 3, 5, and 7. In addition, stream stability and function will be assessed during Years 1, 3, 5, and 7 which includes habitat assessment of restored sections, water quality parameters, bank stability, channel morphology, and aquatic life.

Success Criteria

Wetlands

The seven year goal of the wetland restoration and enhancement is to achieve survival of 125 seedlings/acre or an equal number of naturally regenerated deep-rooted woody species, heights should double in three to five years, and girth should make positive changes. A fully stocked diverse stand of trees with no more than 1-2 trees should dominate an area except within the tupelo-cypress stands. There is a graduated scale for sapling survival throughout the seven year monitoring period. At Year 5, sapling survival should meet 150 trees/acre.

Hydrology success requires meeting the ACOE criterion and falling within 15% of the reference station degree, duration, and periodicity after 7 years. Mean degree of saturation was calculated as the average depth or height of water for all measurements greater than -12 inches. Mean duration was calculated as number of days in which water was greater than -12 inches for all durations over 14 days. Periodicity was calculated as number of cycles in which water was greater than -12 inches for all durations over 14 days. All of these parameters are structured to measure the success of overall mitigation efforts and to determine the health of the restored/enhanced wetlands.

Streams

The seven year goal of the riparian restoration is to achieve survival of 125 seedlings/acre or an equal number of naturally regenerated deep-rooted woody species, heights should double in three to five years, and girth should make positive changes. A fully stocked diverse stand of trees with no more than 1-2 trees should dominate an area except within the tupelo-cypress stands. There is a graduated scale for sapling survival throughout the seven year monitoring period. At Year 5 (Y5), sapling survival should meet 150 trees/ acre.

Physical, chemical, and biological parameters within the stream will show that the systems are returning to a stable system. Habitat scores will show consistent improvement towards reference parameters of 151.7, discriminating macroinvertebrate index will show consistent improvment from baseline and towards reference reach parameter of 70, and floodplain vegetation will increase towards 75% groundcover.

The success criteria and corresponding monitoring results for Year 5 are summarized in Table 1. The specific categories are discussed in further detail below. If the SCMA as a whole is not meeting the success criteria listed in the Banking Instrument (Table 1, Appendix B) contingency will be developed and implemented as necessary. The locations of all current monitoring stations are shown in Figure 2, Appendix A.

III. Wetland Monitoring

A. Wetland Vegetation Plots – Sapling Monitoring

1. Methodology

Eight wetland monitoring stations were selected and permanently marked with a two-inch diameter PVC pole and GPS located. Depending on the community being sampled, station size varied between 0.10 and 0.26 acre plots to achieve a 1% sample of all trees planted. The locations of all current monitoring stations (wetland and riparian) are shown in Figure 2. A total of 177 saplings were initially planted within these eight stations. During Year 5 monitoring, trees were identified and measured to assess survival rates and positive growth in height and girth. Volunteer trees and shrubs were counted toward the station densities if they were at least 18” in height (planted trees were marked and numbered during time of installation so that volunteer species could be added and tracked when appropriate). Existing trees remaining within the monitoring stations after initial clearing (for seed source) were not used in the results presented in this report. Photographs were taken to visually document temporal changes (Appendix C). A complete results table for all vegetation plots can be seen at Table 2 and a complete inventory of planted species is provided in Table 3, Appendix B.

2. Results

Overall, sapling survival within the wetland plots of SCMA exceeds the success criteria for Y5 density requirements per acre (150 trees/acre). Individually, MS 1-6, and MS-10, (at 170 to 400 trees/acre) exceed the Y5 density requirements while MS-12 (90 trees/acre) is below the Y5 density requirement. Significant regeneration of green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), button bush (*Occidentalis cephalanthus*), and bald cypress was still evident throughout the SCMA.

A diverse stand of trees was observed throughout the SCMA. Fifteen tree and shrub species were planted throughout the SCMA wetland restoration/enhancement areas and twenty three species were identified during the Y5 monitoring event. Each monitoring station was represented by three to twelve different tree species; and the most prevalent species (bald cypress) was found primarily at MS-5 where there was significant natural recruitment. Green ash, button bush, and cherry bark oak (*Quercus pagoda*) had the next highest amount of individuals present in the monitoring stations.

Measurements of average height and girth of planted saplings were compared to measurements taken during the Year 1 monitoring period. Average height of trees has doubled during the last five years with 100% of the wetland stations exceeding the standard. Average girth of trees has increased from Year 1 monitoring period. Vegetation plot results can be seen in Table 2.

B. **Hydrologic Monitoring**

1. Methodology

To assess hydrology success of the site, two Infinities USA water level recorders were installed in 5-foot monitoring wells within the Spring Creek Mitigation Area. As agreed upon by the IRT, one reference well is located within the Dry Creek Mitigation Area (Phase I). Water level recorders measure ground water level daily. The ground water data from the monitoring wells are shown in Appendix D; daily measurements of ground water depth are shown for January 1, 2014 through December 31, 2014. The average growing season for Calhoun and Early County is February 23 - December 2. Daily rainfall is gathered and tabulated at a field station located in Arlington, Georgia (*Georgia Automated Environmental Monitoring Network*) located approximately 4.5 miles southeast of the site.

2. Results

Monthly rainfall records show a total rainfall accumulation of 63.78" with 122 days of precipitation (Appendix D). Average annual rainfall is typically 49 inches. Precipitation levels in 2014 were approximately 14 inches above normal.

Monitoring wells SL1 and SL2 were not within 15% range of degree and duration of the reference well DP1; however, all three had surface inundation or saturation of the upper 12 inches for at least 14 consecutive days during the growing season (February 23 through December 2), meeting the basic success requirement for hydrology. SL2 is trending closer (within 20%). SL1 malfunctioned between June and December 2014 and all data was lost for that timeframe (the well was sent back to the manufacturer to attempt to retrieve data; however, the well was too damaged. A new well was installed to record water levels for subsequent monitoring periods). Well data can be seen in Appendix D.

Additionally, indicator-based wetland hydrology parameters were also recorded throughout the mitigation bank areas. Areas W4, W7, W8, and W9 had saturation, surface water, sparsely vegetated concave spots, crayfish burrows, and algal mats; W4, W7, W8, and W9 had aquatic fauna (gastropods and beavers); and W10 had drainage patterns, surface water, and saturation. The Reference areas R1, R2 and the wetland within the Dry Creek area where the reference well is located (DP1) had saturation, drainage patterns, sparely vegetated spots, crayfish burrows, aquatic fauna, and surface water.

C. **Wildlife Utilization**

During monitoring activities, wildlife surveys were conducted by visual observations of species using the mitigation area and by documenting tracks, calls, and scats. Both morning and evening hour survey periods were utilized to best document wildlife usage over an extended period.

A wide array of wildlife was observed utilizing the mitigation areas. A complete table of species documented can be seen in Appendix E. Wild hogs have started to move into the area and have been observed in the old lakebed. At this time, significant damage has not been observed. The hogs have actually helped with thick underbrush removal that was competing with some of our planted trees. If observation of damage and nuisance occurs, increased pressure will be put on the population in the lower portion of the site.

IV. Stream Monitoring

A. Riparian Vegetation Plots – Sapling Monitoring

1. Methodology

See Section 3.A.1 for sapling monitoring methodology.

2. Results

All five riparian monitoring stations at 188 to 420 trees/ acre exceed the Y5 density requirements. Average height of trees has doubled during the last five years with all riparian stations exceeding the standard. Average girth of trees has increased from Year 1. Vegetation Plot results can be seen in Table 2, Appendix B.

A diverse stand of trees was observed throughout the SCMA. Fifteen tree and shrub species were planted throughout the SCMA wetland restoration/enhancement areas and twenty three species were identified during the Y5 monitoring event. Each monitoring station was represented by five to twelve different tree species. The most prevalent species, bald cypress, was found at MS-7, MS-11, MS-13 where there was significant natural recruitment. Green ash, button bush, willow oak (*Quercus phellos*), and swamp chestnut oak (*Quercus michauxii*) had the next highest amount of individuals present in the monitoring stations.

B. Floodplain Vegetation Monitoring

1. Methodology

Each monitoring station was sectioned into quadrants and visually assessed for % of groundcover. In addition, each monitoring station was photographed to document visual assessment of ground cover. These photographs are included in Appendix C. This assessment allows for observation of general trends within a riparian community, nuisance species encroachment, and early discovery of erosion issues.

2. Results

All Riparian stations except MS-8 have reached 75% or greater groundcover. MS-8 had 65% groundcover. Herbaceous recruitment was prevalent and varied depending on site conditions at monitoring stations. Within the riparian areas there was an abundance of broom sedge (*Andropogon virginicus),* sedge (*Carex* spp.), dogfennel (*Eupatorium capillifolium*), ragweed (*Ambrosia artemisiifolia*), goldenrod (*Solidago altissima*), verbena (*Verbena* spp.), and various grasses. The reference stations had minimal herbaceous coverage (15%), but 100% cover when all strata was accounted for. Parts of the reference stations were either bare or covered with a heavy leaf litter (see photo documentation).

C. Water Quality

1. Methodology

Water quality testing was performed at each of the macroinvertebrate/fish sampling reaches using the LaMotte Water Quality Monitoring Kit and the LaMotte 2020 Turbidimeter. Data was compared to reference range data to determine overall trends with water quality.

2. Results

Results for water quality measured within T1, T2, and T3 fell within the appropriate levels for fish and macroinvertebrate living conditions. Results for water quality comparison can be seen in Table 4, Appendix B.

D. **Biological Parameters**

1. Methodology

Macroinvertebrate sampling occurred using *The GAEPD Rapid Bioassessment Standard Operating Procedures for Benthic Macroinvertebrates* and associated metric spreadsheets. A series of jab samples were made from a variety of different habitats within the reaches (sediment, macrophyte beds, woody debris, rootwads, and leafpacks). Samples were packed and shipped to Pennington and Associates for sorting and species identification. The discriminating index score was calculated using the Ecoregion Metric Spreadsheet for 65g-Dougherty Plain (02/2010).

Habitat assessment scores were determined by utilizing the Rapid Bioassessment Protocol for low gradient streams outlined by GA EPD under the guidelines of the U.S. EPA. Items such as available cover, substrate, vegetative protection along banks, bank stability, buffer width, and sediment deposition were reviewed and taken into account as part of the overall scoring process. The streams were scored individually by two scientists from Consolidated Resources and compared as per protocol to determine if total scoring was within 30 points of each other. Raw data sheets and key are attached in Appendix C.

Fisheries assessments were conducted utilizing *The Standard Operating Procedures for Conducting Biomonitoring on Fish Communities in Wadeable Streams in Georgia (2005).* A field reconnaissance was conducted on the streams to determine length of transect and types of habitat available prior to fish collection. Consolidated Resources, LLC and USFWS personnel sampled streams within the mitigation area utilizing seines, electroshocking backpacks (one probe), and dip nets for capture. Fish were counted and identified by USFWS fisheries biologists.

2. Results

Macroinvertebrate index for T1, T2, and T3 have all increased from baseline numbers and are increasing towards reference reach numbers. T1 has increased from 24 to 53, T2 has increased from 36 to 58, and T3 has increased from 37 to 38. In addition, T1 and T3 increased in species richness, while T2 stayed the same. Macroinvertebrate results can be seen in Table 5, Appendix B and the complete metric spreadsheets are attached in

Appendix F. Habitat Assessment scores ranged from 157.5 (T3) to 167.75 (T1) and have increased from baseline scores.

Fish

The results of the electroshocking and seining are presented in Table 7 and are summarized as follows: based on sampling during the Y5 monitoring period, fish communities show an improvement in species richness and total individuals collected from previous monitoring years. T1 had 45 individuals representing eight different species collected, T2 had 28 individuals representing seven species, and T3 had 21 individuals representing two species. This is an overall increase from Year 3 monitoring with a totaled of 10 individuals representing three species.

The majority of species caught were either generalist feeders or insectivores. Two top carnivores (warmouth and chain pickerel) were caught in streams T1 and T2. T1 and T3 had one intolerant/sensitive species, the lake chubsucker, observed during sampling. At this time, IBI integrity class for T1 is Poor while T2 and T3 are Very Poor.

E. **Physical Parameters**

1. Methodology

T1, T2, and T3 were "walked" to observe the reach for erosion, scouring, and stream characterization. In addition, stations were set up at each macroinvertebrate/fish reach to assess Bank Erosion Hazard Index of each system. Each station was assessed using the BEHI assessment created by Dave Rosgen of Wildland Hydrology (Rosgen, 2001).

In order to determine dominant substrate and bedload, a representative sample of the stream reach was collected utilizing the Wolman Pebble Count. Each stream was transversed in a zig-zag pattern until 100 particles were collected and characterized. The results were entered into a Microsoft spreadsheet to analyze and graph percentage of dominant substrate material. These results were also utilized as part of the BEHI final scoring.

Cross-sections of restored streams are included in this monitoring report and compared to previous cross section data to determine if significant changes have occurred since construction.

2. Results

Assessment of physical parameters shows that T1, T2, and T3 have not undergone significant changes and have remained stable since construction.

BEHI scores for the restored reaches range from low to moderate levels of stream bank erosion. The streambanks are well vegetated with the beginnings of overhanging shrubbery and shading along the channel and an established buffer. Root depth along the banks were at an acceptable density to aid in bank stabilization. Bare areas observed were due to game trails along the reaches. Data sheets for BEHI assessment are attached in Appendix G.

Channel substrate within restored reaches ranged from bedrock to silt/clay particles. T1 had a composite dominated by sand, clay, and some gravel with minor bedrock; T2 was dominated by sand and clay particles (old point bars within bends had sand/gravel mix); and T3 was dominated by clay. Iron ore particles were significant throughout T1 and T2 and was classified as gravel during the pebble count. At times, clay would be in ball like structures (marble sized), but was still classified as clay/silt.

Cross-section data show that no significant changes have occurred and the streams are still associated with their adjacent floodplain. (Cross section and stream data are attached in Appendix G).

V. CONCLUSIONS AND RECOMMENDATIONS

As a whole, the SCMA vegetation monitoring areas are meeting the sapling density requirement for success criteria. During Year 5, 12 species were observed in the 13 monitoring stations. Bald cypress was the most common species across the mitigation area. Overall, sapling survival rate is 265 trees/per acre exceeding the Y5 survival rate of 150 trees/acre. Within the wetland monitoring stations there is an average stem density of 247 trees/acre and within the riparian areas, average density is 285 trees/acre. Each station met the success criteria requirements except for MS-12 due to low sapling density. Portions of this station were damaged by a farm vehicle as it was driven into the plot. Additional saplings will be planted in the area affected in the winter of 2015 and updated vegetation monitoring results will be provided in the Year 7 report.

Sampling results indicate that saplings at all stations have doubled in height since Year 1 monitoring and have had a positive increase in girth.

Three to twelve species were observed at each station. No one to two species is dominating an area with the exception of MS-5 (a tupelo-cypress system) and MS-12, an area impacted by field equipment. Tupelo is dominating the MS-5 area due to natural recruitment and MS-12 is dominated by swamp chestnut oak. MS-12 also lost tree diversity due to equipment damage.

Well data indicates that the mitigation bank met basic hydrology success criteria of surface inundation or saturation within the upper 12 inches during the growing season and monitoring wells are within 15% of periodicity of reference well. Well SL2 is trending closer to the 15% range of degree and duration and is anticipated to reach the 15% success criteria by the end of Year 7. The SL1 data logger malfunctioned during Year 5 and no data was recorded from June to December 2014; a new data logger was installed.

Water quality parameters show that the SCMA streams have appropriate living conditions for fish and macroinvertebrates. The alkalinity levels are good indicator that the streams are adequately buffered from extreme changes in pH levels, all streams show a neutral pH, Dissolved Oxygen limits are good for most aquatic life, and Hardness levels are indicative of results you would get within a limestone region, such as SCMA. No environmental concerns or off-site discharges were observed during water quality sampling.

Macroinvertebrate scores have increased since baseline and show improvement towards the reference reach parameter. While T3 has only increased one point from baseline, it has increased eleven points since Y3 monitoring and has a greater species richness than baseline. Habitat diversity has been observed within the sampling area (large woody debris, overhanging shrubbery, shallow pools, macrophyte beds, etc.) but lack the amount of rock that is prevalent in the other areas. T3 is located in the area where hogs and beaver have been seen, but significant damage has not been observed. Macrophyte beds are the predominant habitat in this area. Sampling occurred during the latter part of the sampling season (to allow for water to return to the streams). We recommend that Year 7 sampling occur earlier in the year if possible. If the index does not increase we would need to reassess additional habitat implementation.

While IBI scores still rank the streams as Poor or Very Poor, results from fish sampling showed an increase in individuals collected with a greater variety of species which allow for a greater array of species interaction. IBI numbers have improved from the previous sampling period and Intolerant species were collected in Year 5 from two streams. The beaver dam had been breached before reach recon for fish sampling, but was back in place during the day of the

sampling. Water levels were higher and ponded at T3 with slightly higher turbidity. This may have "diluted" our sampling results due to fish being more difficult to catch. Sampling of this reach was shifted slightly upstream from the original sampling location. The dam was completely removed by end of April.

Based on the physical habitat assessments, the site is showing a continual improvement from baseline scoring. Streambank vegetation (density and width of buffer) has been improving since construction. Baseline riparian areas that were either underwater when the area was a 57 acre lake or part of a mowed, agricultural field are now undergoing transformation into riparian strata layers. Overhanging vegetation and shading are starting to occur on a broader basis within the reaches providing food and habitat for macroinvertebrates and fish and helps keep the water cooler.

Stream geomorphology assessments show improvements over baseline conditions. The majority of the original "streams" were underwater at time of baseline or severely entrenched. Channelization was the primary impact for disconnection of streams within SCMA from their adjacent floodplain. Geomorphic data and particle size distribution indicate that the majority of the restoration areas are stable and have maintained their construction since bank implementation. The pebble counts for each system show a mix of sand, clay, and gravel with T3 having a higher percentage of silt/clay. This system has a larger drainage area than the other two systems and is in an area with high underwater vegetation throughout portions of the growing season. Minor deviations can be attributed to the natural hydraulic functions of the stream. Both T1 and T2 drain into T3.

Low gradient systems make up the SCMA. Little to no erosion has been observed within the bank (except for the occasional game trail observed along T1). With the riparian restoration efforts and the increase in floodplain vegetation it is expected that the Bank Erosion Hazard Index will remain low to moderate. As vegetation continues to improve along the buffer and stream it is expected that the BEHI scores will continue to show low bank erosion for the remaining monitoring period. Because the monitoring stations are lacking significant canopy height at this time, the herbaceous layer is diverse and representative of a successional community. Over time, this stratum will change with increasing shade. Minimal herbaceous coverage was observed within the reference stations as the dense canopy cover shades out most herbaceous species and alluvial deposits cover portions of preservation stations (See Photos).

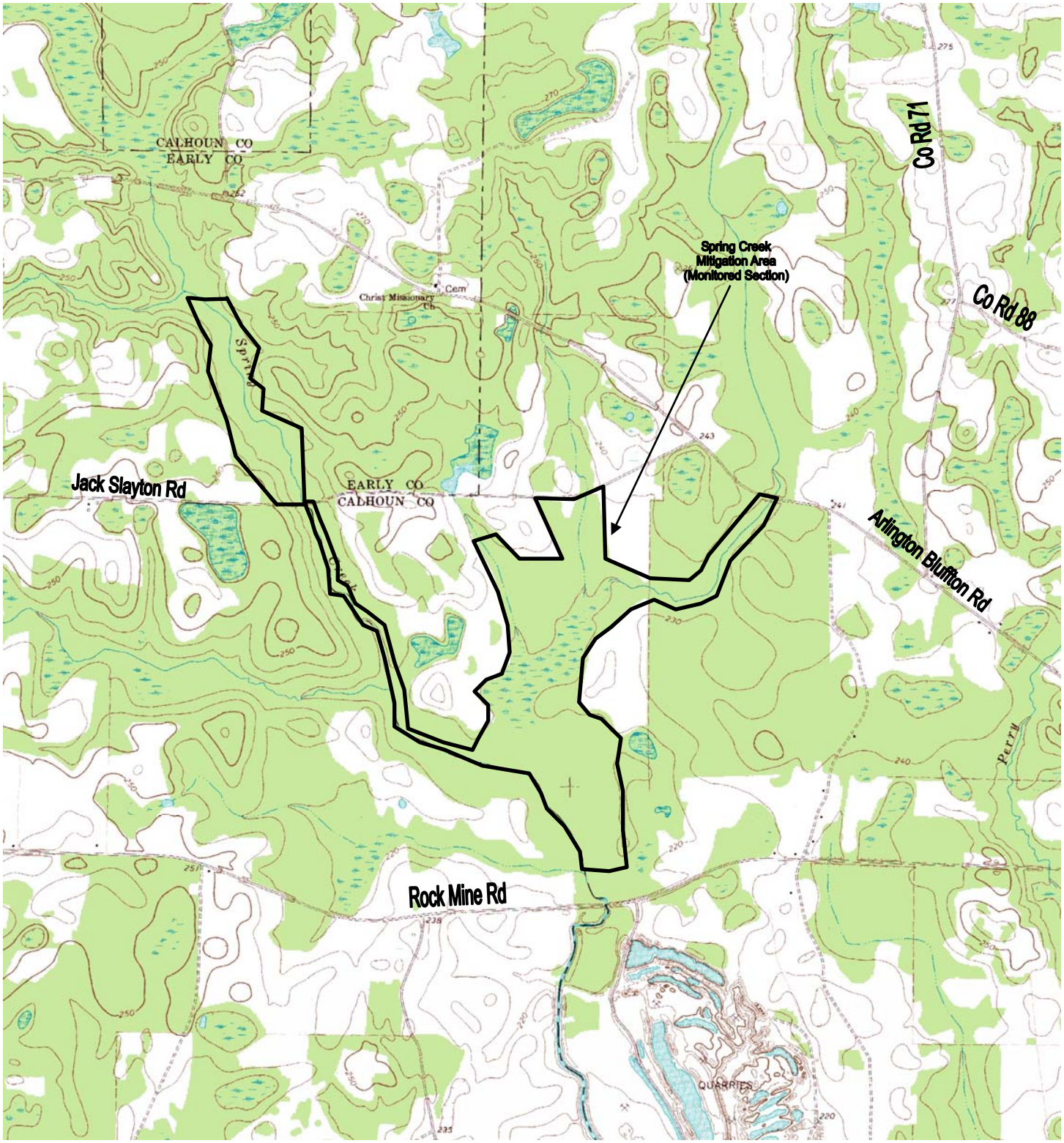
Preservation areas (mature and transitional) continue to function as stable systems and provide a mature habitat component to the SCMA.

A wide array of wildlife activity and use within the wetlands, uplands, and riparian areas was observed within the SCMA throughout the monitoring period. A complete list is shown in Appendix C.

This report provides data for future comparison and evaluation of mitigation success. It is expected that with further monitoring, the progression of the enhancement and restoration areas into diverse, healthy, functioning wetland systems will continue to progress. Monitoring will continue in Year 7; contingency actions are limited to additional plantings in MS-12. The bank boundary will continue to be harrowed twice a year to prevent accidental mowing within the bank boundary. All new employees will be made aware of the bank boundary at time of hire.

APPENDIX A

FIGURES



SOURCE: USGS Bancroft Quadrangle, 1973

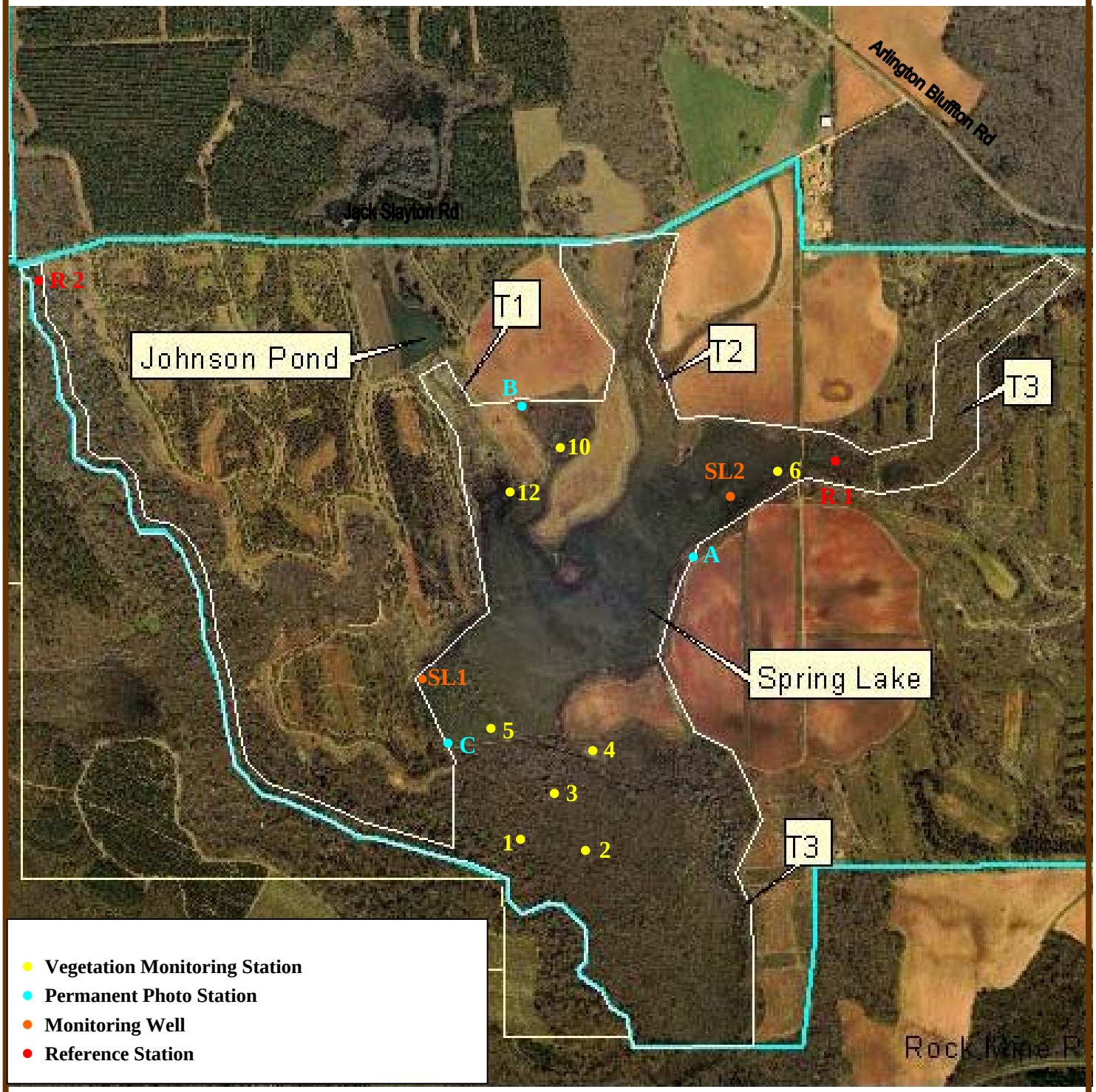
CONSOLIDATED RESOURCES LLC

Figure 1
Location Map

Not To Scale

Kolomoki Miitigation Bank
Spring Creek Area

2029 5TH Avenue
Columbus, Georgia 31904
Phone: 706-317-5942 Fax: 706-571-0726



SOURCE: Google Earth

CONSOLIDATED RESOURCES LLC

Figure 2
Monitoring Station Locations

Not To Scale

Kolomoki Mitigation Bank
Spring Creek Area

2029 5TH Avenue
Columbus, Georgia 31904
Phone: 706-317-5942 Fax: 706-571-0726

SOURCE: USGS Bancroft Quadrangle, 1973

CONSOLIDATED RESOURCES LLC

FIGURE 3
HISTORICAL AERIAL 2009

Not To Scale

Kolomoki Mitigation Bank
Spring Creek Area

2029 5th AVENUE
COLUMBUS, GEORGIA 31904
Phone: 706-317-5942 Fax: 706-571-0726

SOURCE: USGS Bancroft Quadrangle, 1973

CONSOLIDATED RESOURCES LLC

FIGURE 4
AERIAL 2013

Not To Scale

Kolomoki Mitigation Bank
Spring Creek Area

2029 5th AVENUE
COLUMBUS, GEORGIA 31904
Phone: 706-317-5942 Fax: 706-571-0726

APPENDIX B

TABLES

Table 1. Success Criteria and Project Results for 2014

Category	Success Criteria	2014 Results (Year 5)
Sapling Survival (Wetland and Riparian areas)	-302 trees/acre installed -225 trees/acre at end of 3 years (75%) **-150 trees/acre at end of 5 years (50%)** -125 trees/acre at end of 7 years (25%)	- Overall Success of saplings: **Avg. 265 trees/acre end of Y5** - 12 stations exceed Y5 goal - 1 station under Y5 goal
Sapling Growth	-Double in height in 3-5 years -Noticeable positive change in girth	- All stations have met or exceeded goal - All stations had a positive increase
Sapling Diversity	-No 1-2 tree species dominating an area (except Cypress-Tupelo systems)	3 to 12 species were found at each station. 1-2 species are dominating two stations; the cypress system in MS-5 and in MS-12.
Hydrologic Success	-Saturation in the upper 12 inches of soil for 14 consecutive days during the growing season. -Hydrology should match within 15% of the reference well levels for Periodicity, Duration and Degree **after 7 years**.	SL1 and SL2 met this basic hydrologic success criterion.
RBP Habitat Score	-Show consistent improvement towards reference reach parameters (151.7) -Fish Sampling	- T1 thru T3 habitat scores showed consistent improvement from baseline scores (167.75, 164.5, and 157.5, respectively) -Fish Species Richness improved for T1-T3
Discriminating Macroinvertebrate Index	Show consistent improvement towards reference reach parameters (70) Baseline (T1-24, T2-36, T3-37)	Benthic Scores have increased from baseline and show improvement towards reference reach parameters. T1-53, T2-58, T3-38
Stable Stream Profiles	-7 Year goal is to achieve stable stream profiles -Physical, chemical, and biological parameters within the restoration areas will show that the systems are returning to a stable system	Physical, chemical and biological parameters are trending towards the reaches returning to a stable system. No significant changes since construction.
Floodplain Vegetation	-Floodplain vegetation will increase towards 75% ground cover	Herbaceous ground cover is 75% or greater

Table 2: Vegetation Plot Growth Results

Monitoring Station	Density Trees/Acre	2014 Average Height (in inches)	Average Height % Growth*	2014 Average Girth (in inches)	Positive Increase In Girth (since baseline)	Species Richness	Dominant Tree Species	% Floodplain Cover	Meets All Success Criteria Y/N
WETLAND									
MS 1	208	68	196%	.56	Y	6	*Quercus pagoda, Acer rubra, Quercus michauxii, Cephalanthus occidentalis*	100%	Y
MS 2	390	87	278%	.62	Y	8	*Quercus falcata, Fraxinus pennslvanica, Quercus nigra*	100%	Y
MS 3	170	67	123%	.52	Y	9	*Ulmus alata, Acer rubrum, Fraxinus pennslvanica, Cephalanthus occidentalis*	100%	Y
MS 4	340	122	198%	1.14	Y	11	*Taxodium distichum, Acer barbatum, Acer rubrum, Cephalanthus occidentalis*	85%	Y
MS 5	211	122	336%	1.37	Y	5	*Taxodium distichum, Fraxinus pennsylvanica*	100%	Y
MS 6	290	104	395%	.97	Y	7	*Diospyros virginiana, Cepholocanthus occidentalis,Fraxinus pennsylvanica*	100%	Y
MS 10	400	114	217%	.90	Y	12	*Quercus phellos, Acer rubrum, Cephalanthus occidentalis*	65%	Y
MS 12	90	59	195%	.31	Y	3	*Quercus michauxii*	75%	N
RIPARIAN									
MS 7	420	48	109%	.35	Y	5	*Taxodium distichum, Cepholocanthus occidentalis, Quercus michauxii, Fraxinus pennsylvanica*	75%	Y
MS 8	188	88	159%	.96	Y	8	*Fraxinus pennsylvanica, Cepholocanthus occidentalis, Quercus phellos*	65%	Y
MS 9	410	110	224%	.95	Y	12	*Quercus phellos, Liquidambar styraciflua, Carya*	100%	Y
MS 11	315	37	106%	.30	Y	5	*Taxodium distichum, Fraxinus pennsylvanica, Nyssa aquatica*	75%	Y
MS 13	250	44	132%	.29	Y	5	*Quercus michauxii, Taxodium distichum, Nyssa aquatica*	75%	Y
Avg	**481**	**82**	**242%**	**0.71**		**7**			**Y**

*Comparison between Year 1 and Year 5 data was used for results.

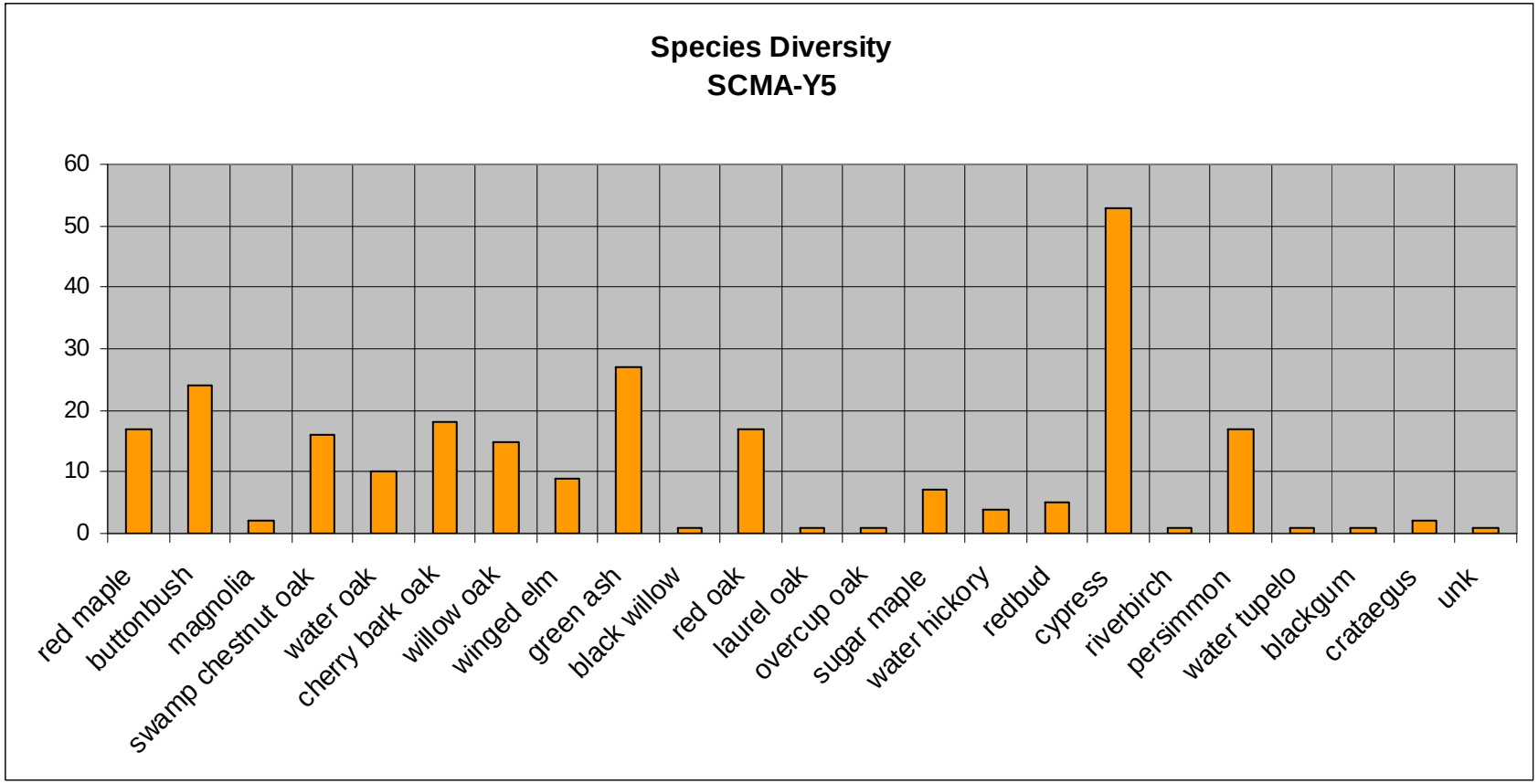

Species Diversity
SCMA-Y5
60
50
40
30
20
10
0
red maple
buttonbush
magnolia
swamp chestnut oak
water oak
cherry bark oak
willow oak
winged elm
green ash
black willow
red oak
laurel oak
overcup oak
sugar maple
water hickory
redbud
cypress
riverbirch
persimmon
water tupelo
blackgum
crataegus
unk

Table 3: Planting Index

Scientific Name	Common Name
Betula nigra	Riverbirch
Carya aquatica	Water Hickory
Cephalanthus occidentalis	Buttonbush
Fraxinus pennsylvanica	Green Ash
Nyssa aquatica	Water Tupelo
Nyssa biflora	Swamp Tupelo
Persea borbonia	Red Bay
Quercus laurifolia	Laurel Oak
Quercus lyrata	Overcup Oak
Quercus michauxii	Swamp Chestnut Oak
Quercus nigra	Water Oak
Quercus pagoda	Cherry Bark Oak
Quercus phellos	Willow Oak
Quercus shumardii	Shumard Oak
Taxodium distichum	Bald Cypress

Table 4: Water Chemistry Results

	Habitat Parameters/(Ideals)	Regional Reference Range	Year 1			Year 3			Year 5		
			T1	T2	T3	T1	T2	T3	T1	T2	T3
Chemistry (in situ)	Water Temperature (°C)	--	18	18	17	14	13.5	13.3	21	22	27
	Dissolved Oxygen (mg/l)	7.6-9.7	6.9	6.7	7.9	7.6	10.45	9.5	5.4	6.4	5.6
	pH (SU)	6.6-7.4	7.0	6.5	6.7	6.5	7.5	7.5	6.5	6.5	7.0
	Turbidity (NTU)	3.4-15.6	6	12	2	11	19	16	7	35	10
	Alkalinity (mg/l as CaCO3)	13.4-176.0	19	24	30	35	45	200	50	70	170
	Hardness (mg/l as CaCO3)	22.2-196.9	23	27	39	40	40	60	50	70	160

Table 5: Site Index Scores for Macroinvertebrate Sampling and Habitat Assessment Score

	Baseline		Year 1		Year 3		Year 5		
Reach	Index Score	Total Taxa Richness	Index Score	Total Taxa Richness	Index Score	Total Taxa Richness	Index Score	Total Taxa Richness	Habitat Assessment Score
T1	24	5	42	28	49	46	53	25	167.75
T2	36	23	43	22	50	30	58	23	164.5
T3	37	10	20	16	27	11	38	20	157.5

Table 6: Fish Community IBI Metric Values and Total Scores

		T1		T2		T3	
Metric Category	**Metrics**	**Score**	**Value**	**Score**	**Value**	**Score**	**Value**
Richness/ Composition	Total # of native fish species	3	8	1	6	1	5
	Total # of benthic invertivore species	3	1	1	0	1	0
	Total # of native sunfish species	5	3	3	2	3	1
	Total # of native insectivorous cyprinid species	0	0	0	0	0	0
	Total # of native round-bodied sucker species	5	1	1	0	5	1
	Total # of sensitive species	5	1	1	0	5	1
Trophic Composition and Dynamics	Evenness	1	N/A*	1	N/A*	1	N/A*
	% of individuals as *Lepomis*	3	0.31	3	0.46	1	0.05
	% of individuals as insectivorous cyprinids	1	0	1	0	1	0
Fish Abundance and Condition	% of individuals as generalists/herbivores	1	0.64	1	0.36	1	0.81
	% of individuals as benthic fluvial specialist	1	0.04	1	0	1	0
	# of individuals collected per 200 meters	1	50	1	32	1	12
	% of individuals with external anomalies (DELTS)	-0	.02	-0	.03	-0	0
Total Integrity Class		**29**		**15**		**21**	

***An automatic score of 1 is given due to collection of less than 100 individuals**

Table 7: Fish Species Collected During Year 5

Species	**Sample Station**		
	T1	**T2**	**T3**
Ameiurus natalis/yellow bullhead	2	7	1
Ellassoma zonatum/pygmy banded sunfish	0	0	1
Erimyzon sucetta/lake chubsucker	1	0	1
Esox niger/chain pickerel	0	5	0
Etheostoma fusiforme/swamp darter	1	0	0
Gambusia holbrookii/mosquito fish	22	3	17
Lepomis cyanellus/green sunfish	1	8	1
Lepomis gulosus/warmouth	9	0	0
Lepomis macrochirus/bluegill	4	4	0
Notemigonus crysoleucus/golden shiner	5	0	0
Hybrid blue-green	0	1	0
Total Number of Species	8	6	5
Total Number of Individuals	45	28	21

APPENDIX C

SITE PHOTOGRAPHS

Permanent Photo Locations

Photo Station A

Photo Station B

Photo Station C

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-2

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-3

East

West

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-4

East

West

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-5

East

West

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-6

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-8

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-9

East

West

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-10

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

MS-12

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

Permanent
Wetland
R2-South

East

West

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

North

South

Permanent
Riparian Station
North

East

West

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

Vegetation Sampling Plot
Wetland and Riparian Areas

Cypress sapling damaged by vehicle driving through in MS-12. Tree was pushed onto the ground but was easily pulled back up and measured.

Swamp chestnut oak sapling within MS-12. Sapling was overcrowded but surviving/thriving.

Insect damage to planted tree within MS-4.

Bent cypress due to extensive overgrowth in MS-11. Overgrowth was clipped back.

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Vegetation Sampling Plot
Wetland and Riparian Areas

Standing in MS-5 overlooking existing mature cypress tree.

Overlooking planted cypress in MS-5.

Thriving Quercus in MS-2.

Overlooking thriving river birch in MS-5.

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Beaver dam and flooding at T3.

Flooding of roadway and adjacent wetlands at T3.

Looking upstream of T1.

Looking downstream of T1.

Stream Sampling

Macrphyte bed observed during macroinvertebrate collection.

Overlooking step pool flow and bedrock substrate within T1.

Fish sampling within T2.

Fish sampling within T3.

Overlooking thriving river birch in MS-5.

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

Stream Sampling

Looking upstream of T3 during water chemistry testing.

Overlooking natural step-pool section in T1.

Water quality testing within T1.

Testing for turbidity during water quality monitoring.

Kolomoki

Kolomoki Mitigation Bank
Spring Creek Area
Year 5

Clay, County

CONSOLIDATED RESOURCES LLC

APPENDIX D

WELL AND RAINFALL DATA

Appendix D
Monthly Rainfall Data Arlington Station
Annual Monitoring Report - Year 5
Kolomoki Mitigation Bank, Spring Creek Mitigation Area

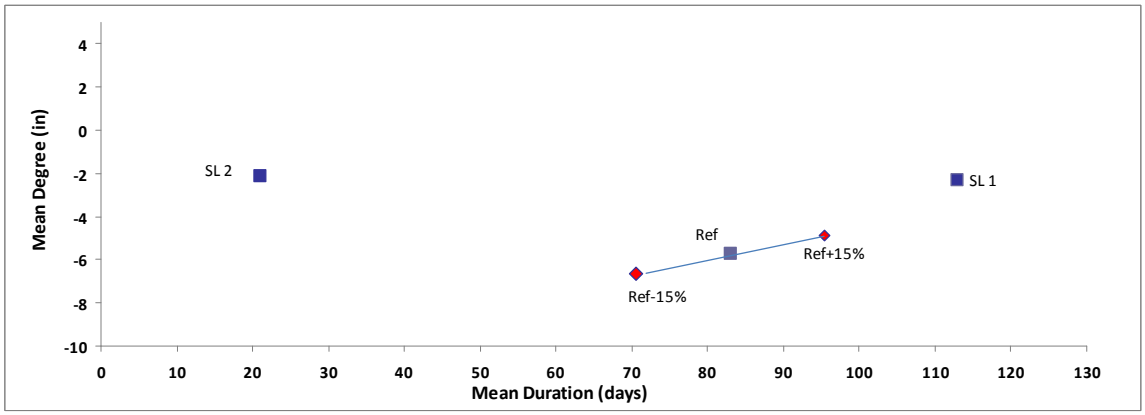
Month	Station*	Normal	Actual	Difference	# of Days w/ Precipitation
Jan-14	Arlington	3.75	3.54	-0.21	14.00
Feb-14	Arlington	4.05	6.52	2.47	13.00
Mar-14	Arlington	5.31	5.88	0.57	12.00
Apr-14	Arlington	4.73	13.09	8.36	8.00
May-14	Arlington	5.75	1.67	-4.08	10.00
Jun-14	Arlington	3.81	3.82	0.01	11.00
Jul-14	Arlington	3.23	2.29	-0.94	10.00
Aug-14	Arlington	3.97	1.96	-2.01	10.00
Sep-14	Arlington	5.36	8.35	2.99	12.00
Oct-14	Arlington	3.64	5.19	1.55	4.00
Nov-14	Arlington	3.52	4.36	0.84	6.00
Dec-14	Arlington	2.48	7.11	4.63	12.00
Total Rainfall for 2014		49.60	63.78	14.18	122.00

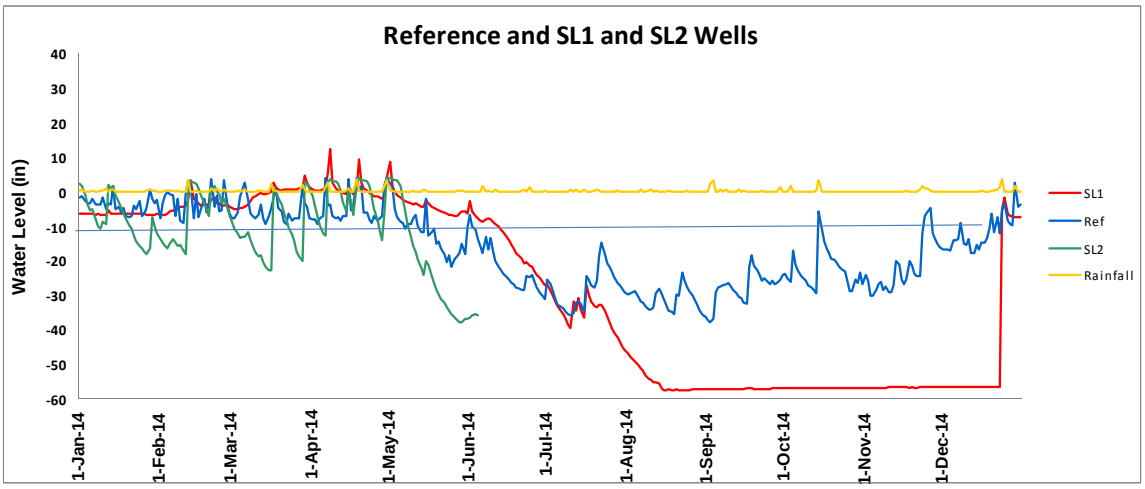
Georgia Automated Environmental Monitoring Station

*Closest available station to Kolomoki Mitigation Bank

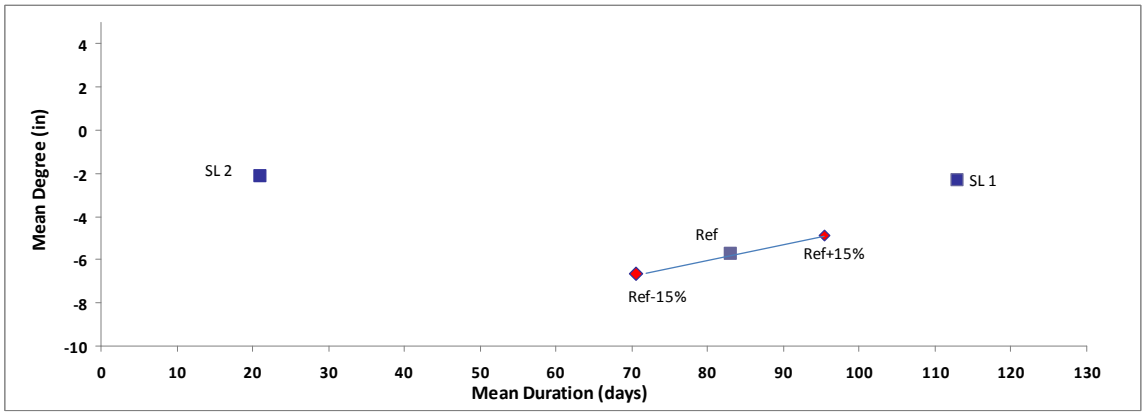
**Rainfall data taken during period of groundwater monitoring: Jan 1st-Nov 2nd.

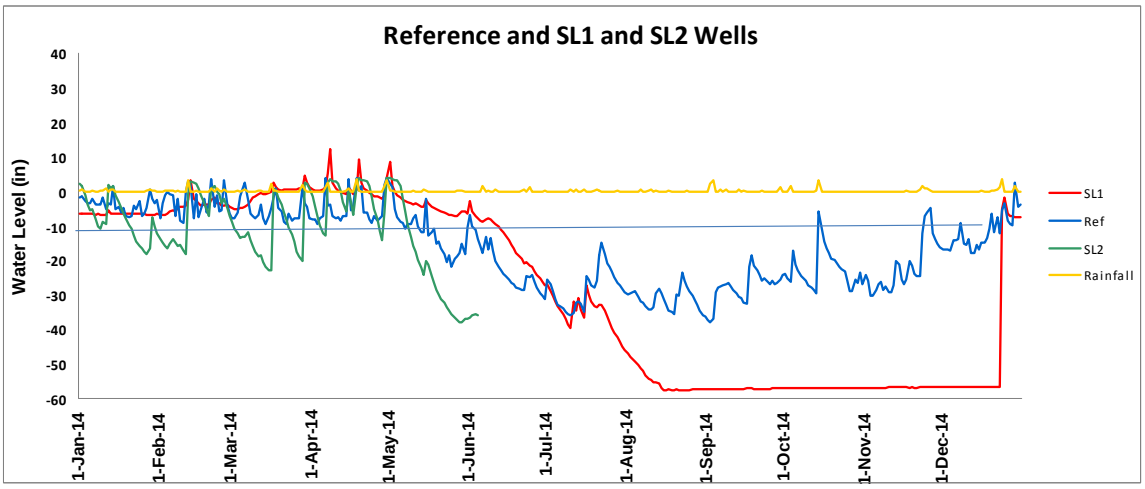
Kolomoki-SCMA
Well Data Year Five



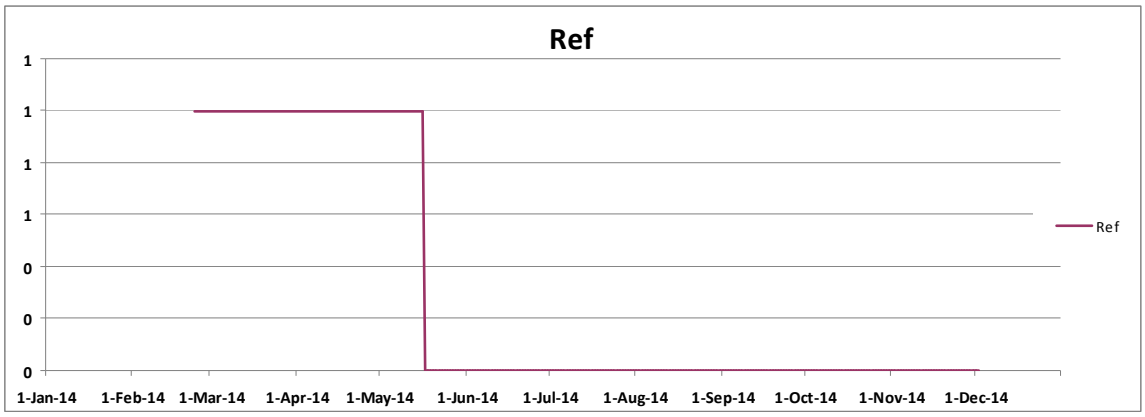


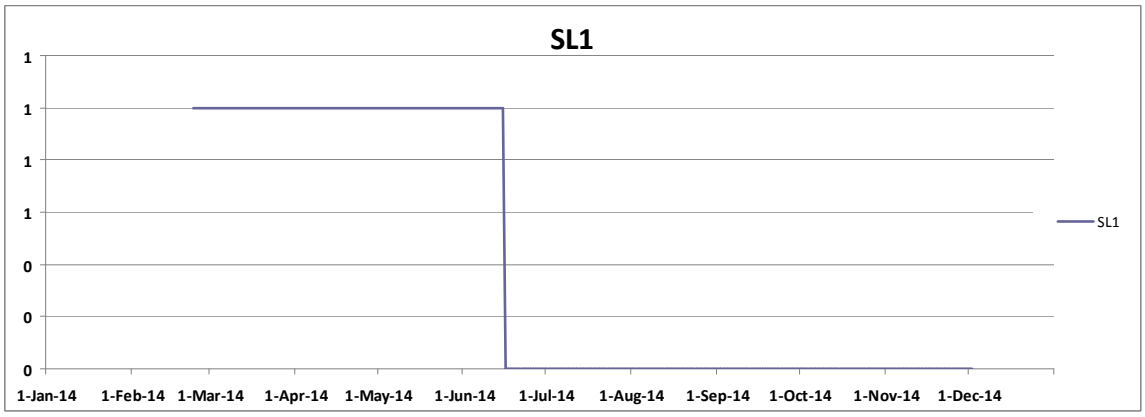
Kolomoki-SCMA
Well Data Year Five



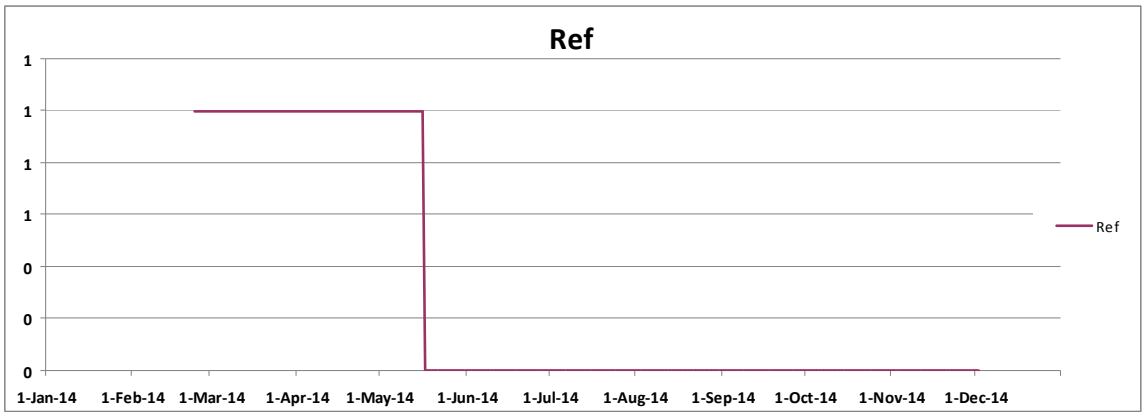


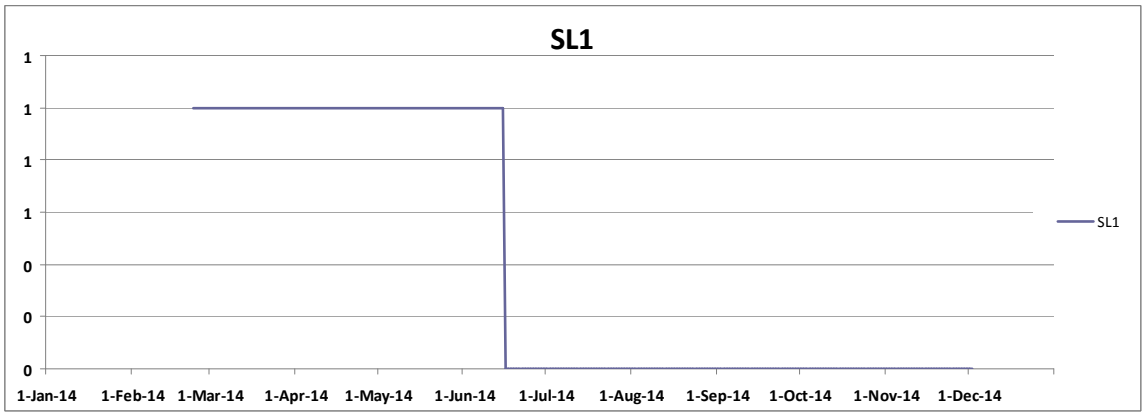
Kolomoki-SCMA
Well Data Year Five



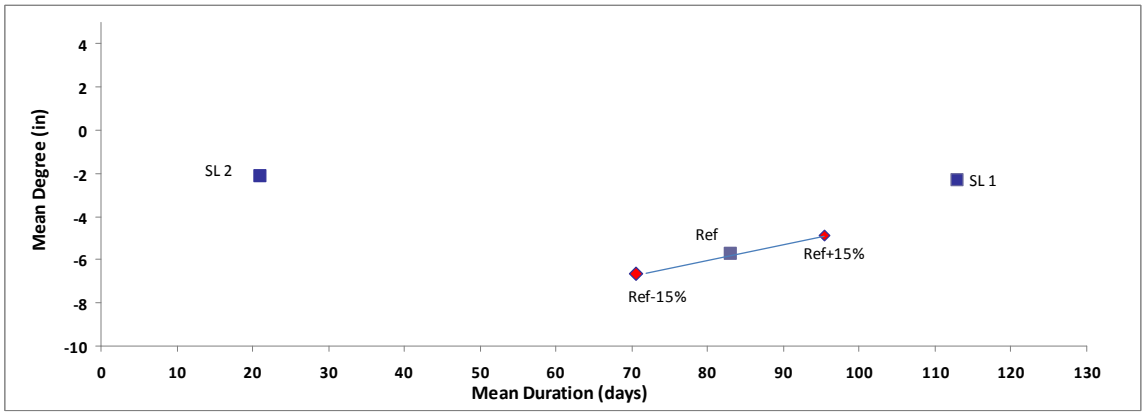


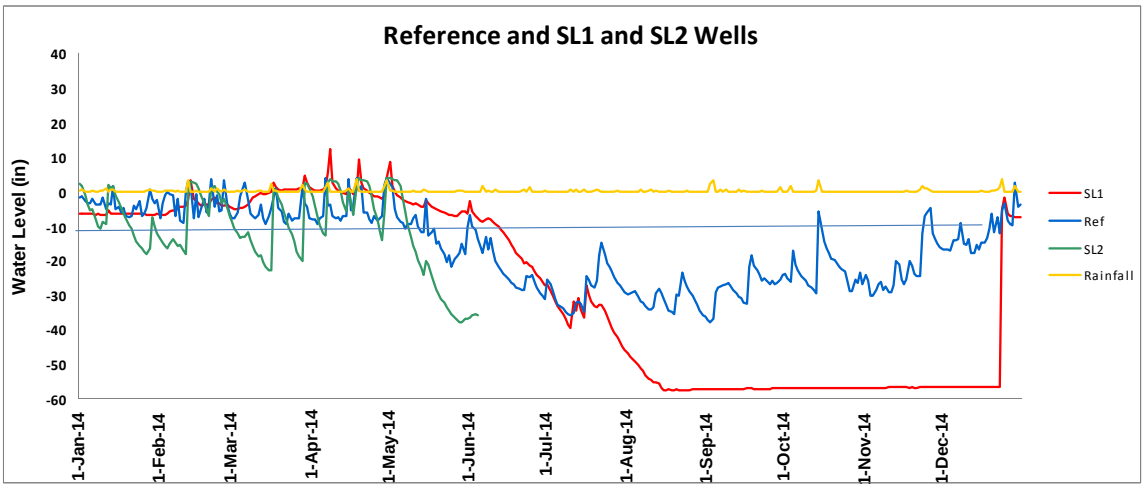
Kolomoki-SCMA
Well Data Year Five



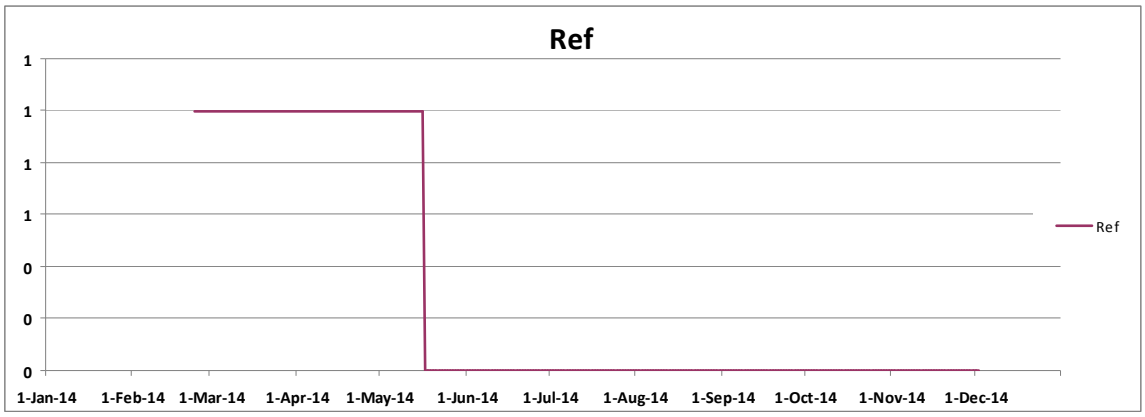


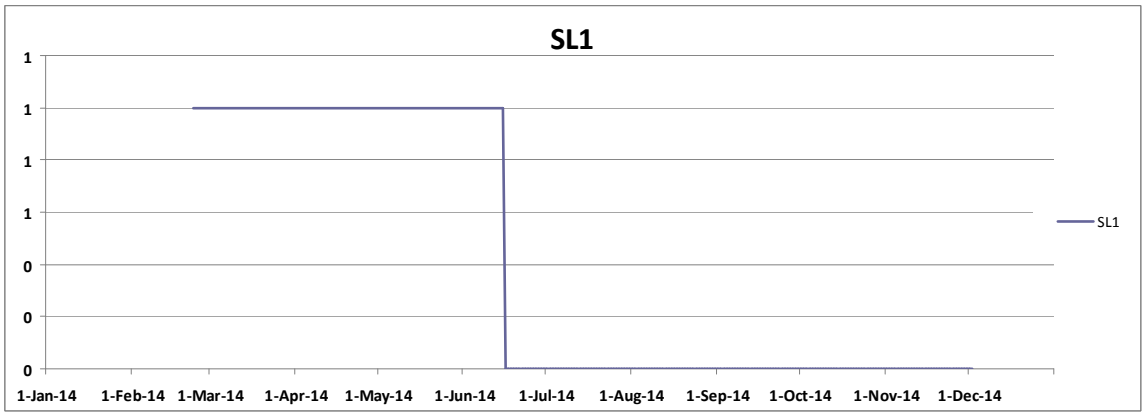
Kolomoki-SCMA
Well Data Year Five



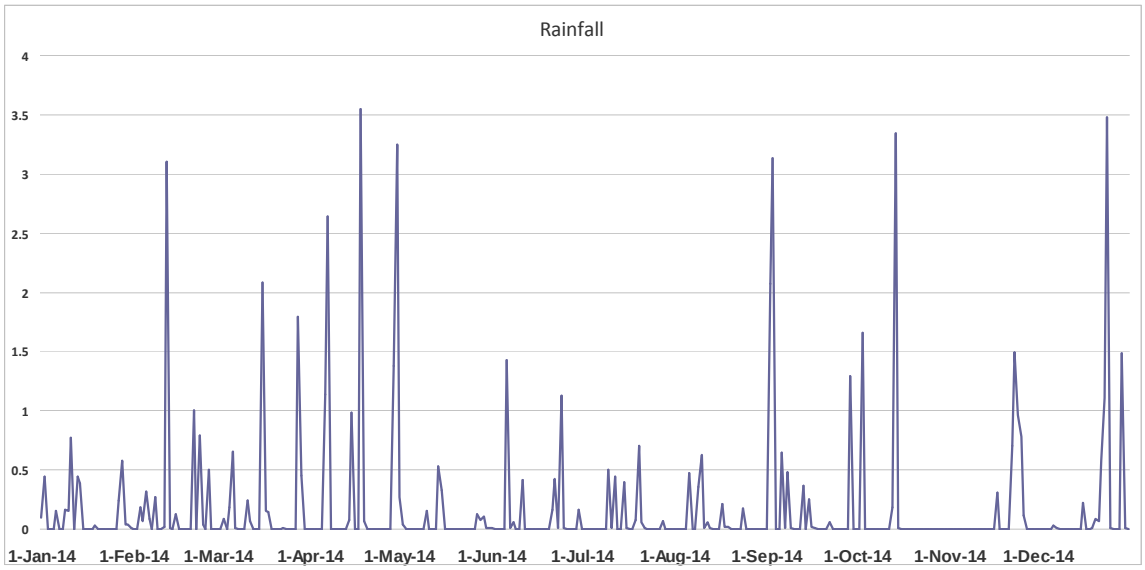


Kolomoki-SCMA
Well Data Year Five





Kolomoki-SCMA
Well Data Year Five



APPENDIX E

WILDLIFE UTILIZATION

Scientific Name	Common Name
Amphibians/Reptiles	
Agkistrodon piscivorus	eastern cottonmouth[1]
Alligator mississipiensis	American alligator[1]
Anolis carolinensis	green anole[1]
Chelydra serpentina	snapping turtle[1]
Coluber constrictor priapus	southern black racer[1]
Crotalus adamanteus	eastern diamondback rattlesnake[1]
Crotalus horridus	timber rattlesnake[1]
Elaphe obsolete spiloides	Grey rat snake[1]
Hyla cinerea	green tree frog[1]
Hyla versicolor	gray treefrog[1]
Lampropeltis getula	eastern kingsnake[1]
Nerodia sipedon pleuralis	Midland water snake[1]
Opheodrys vernalis	rough green snake[1]
Rana catesbeiana	American bullfrog [1,2]
Rana uticularia	southern leopard frog[1]
Sceloporus undulatus	eastern fence lizard[1]
Siren intermedia	lesser siren[1]
Terrapene carolina carolina	eastern box turtle[1]
Trachemys scripta scripta	yellowbelly pond slider[1]
Birds	
Agelaius phoeniceus	red-winged blackbird[1,2]
Archilochus colubris	ruby throated hummingbird[1]
Ardea alba	great egret[1]
Ardea herodius	great blue heron[1]
Baeolophus bicolor	tufted titmouse[1,2]
Buteo jamaicensis	red-tailed hawk[1]
Buteo lineatus	red-shouldered hawk[1,2]
Cardinalis cardinalis	northern cardinal [1,2]
Cathartes atratus	black vulture[1]
Cathartes aura	turkey vulture[1]
Circus cyaneus	northern harrier[1]
Colaptes auratus	northern flicker[1,2]
Colinus virginianus	bob-white quail [1,2]
Corvus americana	American crow [1,2]
Cyanocitta cristata	bluejay [1,2]
Haliaeetus leucocephalus	bald eagle[1]
Melanerpes carolinus	red-bellied woodpecker[1]
Mimus polyglottos	northern mockingbird[1]
Pandion haliaetus	osprey[1]
Picoides pubescens	downy woodpecker[1,2]
Pipilo erythrophthalmus	eastern towhee[1,2]
Poecile carolinesis	Carolina chickadee[1,2]
Sayornis phoebe	eastern phoebe[1]
Scolapax minor	American woodcock[1,2]
Setophaga coronata	yellow-rumped warbler
Sialia sialis	eastern bluebird[1,2]
Spizella passerina	chipping sparrow[1,2]

Spizella pusilla	field sparrow[1,2]
Strix varia	barred owl[1,2]
Thryothorus ludovicianus	Carolina wren[1]
Turdus migratorius	American robin[1,2]
Tyrannus tyrannus	Eastern kingbird
Vireo griseus	white eyed vireo[2]
Zenaida macroura	mourning dove[1,2]

Fish	
Ameiurus natalis	yellow bullhead[1]
Ellassoma zonatum	pygmy banded sunfish[1]
Erimyzon sucetta	lake chubsucker[1]
Esox americanus	pickerel[1]
Esox niger	chain pickerel[1]
Etheostoma fusiforme	swamp darter[1]
Etheostoma stigmaeum	speckled darter[1]
Hybopsis lineapunctata	lined chub[1]
Gambusia holbrooki.	mosquito fish [1]
Lepomis cyanellus	green sunfish[1]
Lepomis gulosus	warmouth[1]
Lepomis macrochirus	bluegill[1]
Notemigonus crysoleucas	golden shiner[1]
Noturus leptacanthus	mad tom[1]
Invertebrates	
Acheta domestica	field cricket[1]
Acrididae	grasshopper[1]
Anax junius	green darner[1]
Apis mellifera	honeybee[1,2]
Argiope aurantia	black and yellow argioper[1]
Biorhiza pallida	gall wasp[1]
Cambarus spp	crayfish[1]
Coccilidae spp.	ladybug[1]
Culicidae spp.	mosquito[1]
Dasymutilla occidentalis	velvet ant
Diptera	gnat[1]
Dytiscus spp.	diving beetle[1]
Erythroneura comes	scarlet and green leafhopper
Gasteracantha elipsoides	crablike spiny orb weaver[1]
Gerris remigis	common water strider[1]
Ixodidae	tick[1]
Leptoglossus phyllopus	leaf-footed beetle[1]
Lycosidae	wolf spider[1]
Nephila clavipes	golden-silk spider
Pachydiplax longipennis	Swift long-winged skimmer[1]
Papilio glaucus	Eastern tiger swallowtail[1]
Papilio troilus	spicebush swallowtail[1]
Phoebis sennae	cloudless sulphur[1]
Photinus pyralis	firefly[1]
Polistes carolina	red wasp[1]
Solenopsis geminata	fire ant[1]

Tetragnatha laboriosa	long -jawed orb weaver[1]
Tipula spp.	crane fly[1]
Vespula spp.	yellow jacket[1]
Mammals	
Canis latrans	coyote[3]
Didelphis virginiana	Virginia opposum[3]
Felis rufus	bobcat[3]
Odocoileus virginianus	white-tailed deer[3]
Procyon lotor	common raccoon[3]
Sciurus carolinensis	eastern gray squirrel[1]
Sciurus niger	eastern fox squirrel[1]
Sigmodon hispidus	hispid cotton rat[1]
Sylvilagus floridanus	eastern cottontail[1]
Sylvilagus palustris	marsh rabbit[3]
Sus scrofa	wild hog[1,3]
Castor canadensis	beaver[3]

[1]Visual, [2]Audible, [3]Tracks/Scat

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

(65) SOUTHEASTERN PLAINS	
65g Metric Index - Dougherty Plain	
Metric	**Metric Category**
EPT Taxa	Richness
% Oligochaeta	Composition
% Intolerant Individuals	
HBI	Tolerance/Intolerance
Filterer Taxa	Functional Feeding Group
Clinger Taxa	Habit

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
EPT Taxa

# of Ephemeroptera *Taxa*	# of Plecoptera *Taxa*	# of Trichoptera *Taxa*
2	1	0

EPT Taxa
3.00

Site Name or Site Identification Number
SCMA (T1)-Year 5

*EPT Taxa is # of different taxa that are EPT, not total individuals that are EPT.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Oligochaeta

Oligochaeta *# of Individuals*	Total Individuals For Site
0	191

Calculated % Oligochaeta
0.0000

Site Name or Site Identification Number
SCMA (T1)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Intolerant Individuals

# of Intolerant *Individuals*	Total Individuals For Site
10	191

Calculated % Intolerant Individuals
5.2356

Site Name or Site Identification Number
SCMA (T1)-Year 5

Intolerant Individuals have a Tolerance value that is <=3.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Hilsenhoff Biotic Index

Taxa Group			
Final Identification	**# of Specimens**	**Tolerance Value**	
Cyclopoida	1	8	8
Attheyella sp.	3	8	24
Crangonyx sp.	3	8	24
Caecidotea sp.	3	6	18
Lirceus lineatus	6	7.7	46.2
Faxonella clypeata	16	8	128
Baetidae	5	4	20
Leptophlebiidae	7	2.53	17.71
Perlodidae	3	2	6
Microtendipes pedellus group	2	6.2	12.4
Polypedilum flavum	1	6.67	6.67
Polypedilum illinoense group	1	9.2	9.2
Corynoneura sp.	37	6.2	229.4
Cricotopus sp.	45	8.12	365.4
Eukiefferiella brehmi group	15	3.7	55.5
Limnophyes sp.	2	8	16
Nanocladius sp.	5	7.2	36
Orthocladius lignicola	1	5.8	5.8
Parametriocnemus sp.	7	3.7	25.9
Thienemanniella xena	2	6	12
Zalutschia briani	19	7	133
Zavrelimyia sp.	1	9.3	9.3
Simulium sp.	6	4.4	26.4

Calculated HBI
6.4653

Site Name or Site Identification Number
SCMA (T1)-Year 5

			0
			0
			0
			0
			0
			0
			0
			0
			0
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			0
			0
			0
			0
			0
			0
			0
			0

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Filterer Taxa

# of Filterer *Taxa*
5

Filterer Taxa
5.00

Site Name or Site Identification Number
SCMA (T1)-Year 5

*Filterer Taxa is # of different taxa that are filterers, not total individuals that are filterers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Clinger Taxa

# of Clinger *Taxa*
4

Clinger Taxa
4.00

Site Name or Site Identification Number
SCMA (T1)-Year 5

*Clinger Taxa is # of different taxa that are clingers, not total individuals that are clingers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

	Calculated Metric Score	Standardized Metric Scores
Metrics		
EPT Taxa	3.00	19.86754967
% Oligochaeta	0	100.00
% Intolerant Individuals	5.235602094	12.00826168
HBI	6.47	73.06
Filterer Taxa	5.00	74.62686567
Clinger Taxa	4.00	40.81632653

Final Index Score for Site
53

Site Name or Site Identification Number
SCMA (T1)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Macroinvertebrate Ranking of Subecoregion 65g (Dougherty Plain)		Site Name or Site Identification Number
Metrics	**Standardized Metric Scores/Index Score/Site Ranking**	SCMA (T1)-Year 5
EPT Taxa	19.87	
% Oligochaeta	100.00	
% Intolerant Individuals	12.01	
HBI	73.06	
Filterer Taxa	74.63	
Clinger Taxa	40.82	
Site Index Score	53	

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

(65) SOUTHEASTERN PLAINS	
65g Metric Index - Dougherty Plain	
Metric	**Metric Category**
EPT Taxa	Richness
% Oligochaeta	Composition
% Intolerant Individuals	
HBI	Tolerance/Intolerance
Filterer Taxa	Functional Feeding Group
Clinger Taxa	Habit

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
EPT Taxa

# of Ephemeroptera *Taxa*	# of Plecoptera *Taxa*	# of Trichoptera *Taxa*
4	1	0

EPT Taxa
5.00

Site Name or Site Identification Number
SCMA (T2)-Year 5

*EPT Taxa is # of different taxa that are EPT, not total individuals that are EPT.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Oligochaeta

Oligochaeta *# of Individuals*	Total Individuals For Site
0	210

Calculated % Oligochaeta
0.0000

Site Name or Site Identification Number
SCMA (T2)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Intolerant Individuals

# of Intolerant *Individuals*	Total Individuals For Site
13	210

Calculated % Intolerant Individuals
6.1905

Site Name or Site Identification Number
SCMA (T2)-Year 5

Intolerant Individuals have a Tolerance value that is <=3.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Hilsenhoff Biotic Index

Taxa Group			
Final Identification	**# of Specimens**	**Tolerance Value**	
Ostracoda	1	8	8
Calanoida	1	8	8
Attheyella sp.	1	8	8
Crangonyx sp.	2	8	16
Caecidotea sp.	10	6	60
Lirceus lineatus	6	7.7	46.2
Faxonella clypeata	51	8	408
Baetidae	39	4	156
Plauditus dubius group.	6	4	24
Ephemerellidae	1	1.63	1.63
Leptophlebiidae	8	2.53	20.24
Perlidae	4	1	4
Polypedilum flavum	1	6.67	6.67
Corynoneura sp.	2	6.2	12.4
Cricotopus sp.	32	8.12	259.84
Eukiefferiella brehmi group	7	3.7	25.9
Parametriocnemus sp.	3	3.7	11.1
Rheocricotopus glabricollis	10	7.25	72.5
Rheocricotopus sp.	1	7.25	7.25
Tvetenia paucunca	1	3.95	3.95
Zalutschia briani	5	7	35
Prosimulium mixtum	3	3.3	9.9
Simulium tuberosum	13	6	78

Calculated HBI
6.1702

Site Name or Site Identification Number
SCMA (T2)-Year 5

Myxosargus sp.	1	7	7
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
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			0
			0
			0
			0
			0

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Filterer Taxa

# of Filterer *Taxa*
4

Filterer Taxa
4.00

Site Name or Site Identification Number
SCMA (T2)-Year 5

*Filterer Taxa is # of different taxa that are filterers, not total individuals that are filterers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Clinger Taxa

# of Clinger *Taxa*
5

Clinger Taxa
5.00

Site Name or Site Identification Number
SCMA (T2)-Year 5

*Clinger Taxa is # of different taxa that are clingers, not total individuals that are clingers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

	Calculated Metric Score	Standardized Metric Scores
Metrics		
EPT Taxa	5.00	33.11258278
% Oligochaeta	0	100.00
% Intolerant Individuals	6.19047619	14.19833989
HBI	6.17	88.19
Filterer Taxa	4.00	59.70149254
Clinger Taxa	5.00	51.02040816

Final Index Score for Site
58

Site Name or Site Identification Number
SCMA (T2)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Macroinvertebrate Ranking of Subecoregion 65g (Dougherty Plain)		Site Name or Site Identification Number
Metrics	**Standardized Metric Scores/Index Score/Site Ranking**	SCMA (T2)-Year 5
EPT Taxa	33.11	
% Oligochaeta	100.00	
% Intolerant Individuals	14.20	
HBI	88.19	
Filterer Taxa	59.70	
Clinger Taxa	51.02	
Site Index Score	58	

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

(65) SOUTHEASTERN PLAINS	
65g Metric Index - Dougherty Plain	
Metric	**Metric Category**
EPT Taxa	Richness
% Oligochaeta	Composition
% Intolerant Individuals	
HBI	Tolerance/Intolerance
Filterer Taxa	Functional Feeding Group
Clinger Taxa	Habit

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
EPT Taxa

# of Ephemeroptera *Taxa*	# of Plecoptera *Taxa*	# of Trichoptera *Taxa*
1	0	0

EPT Taxa
1.00

Site Name or Site Identification Number
SCMA (T3)-Year 5

*EPT Taxa is # of different taxa that are EPT, not total individuals that are EPT.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Oligochaeta

Oligochaeta *# of Individuals*	Total Individuals For Site
0	177

Calculated % Oligochaeta
0.0000

Site Name or Site Identification Number
SCMA (T3)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
% Intolerant Individuals

# of Intolerant *Individuals*	Total Individuals For Site
0	177

Calculated % Intolerant Individuals
0.0000

Site Name or Site Identification Number
SCMA (T3)-Year 5

Intolerant Individuals have a Tolerance value that is <=3.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Hilsenhoff Biotic Index

Taxa Group			
Final Identification	**# of Specimens**	**Tolerance Value**	
Ostracoda	2	8	16
Cyclopoida	12	8	96
Attheyella sp.	40	8	320
Crangonyx sp.	8	8	64
Faxonella clypeata	33	8	264
Acerpenna sp.	18	3.7	66.6
Ceratopogonidae	2	6.65	13.3
Corynoneura sp.	8	6.2	49.6
Cricotopus sp.	11	8.12	89.32
Eukiefferiella brehmi group	1	3.7	3.7
Limnophyes sp.	1	8	8
Parakiefferiella sp.	1	5.9	5.9
Parametriocnemus sp.	4	3.7	14.8
Rheocricotopus glabricollis	7	7.25	50.75
Zalutschia briani	19	7	133
Zavrelimyia sp.	2	9.3	18.6
Muscidae	2	6	12
Simulium sp.	2	4.4	8.8
			0
			0
			0
			0
			0

Calculated HBI
7.1351

Site Name or Site Identification Number
SCMA (T3)-Year 5

			0
			0
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			0
			0
			0
			0
			0
			0
			0
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			0
			0
			0

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Filterer Taxa

# of Filterer *Taxa*
4

Filterer Taxa
4.00

Site Name or Site Identification Number
SCMA (T3)-Year 5

*Filterer Taxa is # of different taxa that are filterers, not total individuals that are filterers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Metric
Clinger Taxa

# of Clinger *Taxa*
2

Clinger Taxa
2.00

Site Name or Site Identification Number
SCMA (T3)-Year 5

*Clinger Taxa is # of different taxa that are clingers, not total individuals that are clingers.

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

	Calculated Metric Score	Standardized Metric Scores
Metrics		
EPT Taxa	1.00	6.622516556
% Oligochaeta	0	100.00
% Intolerant Individuals	0	0
HBI	7.14	38.71
Filterer Taxa	4.00	59.70149254
Clinger Taxa	2.00	20.40816327

Final Index Score for Site
38

Site Name or Site Identification Number
SCMA (T3)-Year 5

GADNR/EPD MACROINVERTEBRATE MULTI-METRIC INDICES
SOUTHEASTERN PLAINS (65)
Dougherty Plain (65g) Metric Index

Macroinvertebrate Ranking of Subecoregion 65g (Dougherty Plain)		Site Name or Site Identification Number
Metrics	**Standardized Metric Scores/Index Score/Site Ranking**	SCMA (T3)-Year 5
EPT Taxa	6.62	
% Oligochaeta	100.00	
% Intolerant Individuals	0.00	
HBI	38.71	
Filterer Taxa	59.70	
Clinger Taxa	20.41	
Site Index Score	38	

APPENDIX F

MACROINVERTEBRATE METRICS/HABITAT/STREAM SCORE

Kolomoki Mitigation Bank, Spring Creek Mitigation Area-Year 5
Habitat Assessment

Tributary ID: T1

Epifaunal Substrate/Available Cover: Habitat Types Present: Overhanging shrubbery, shallow pools, macrophyte beds, thick root mats, large rocks, riffles with lots of turbulence over rocks
Score: 18, 19 (18.5)
Pool Substrate Characterization: Firm sand, with root mats. Occasional gravel and bedrock.
Score: 17.5, 20 (18.75)
Pool Variability: Large and shallow, evenly mixed.
Score: 8, 10 (9)
Sediment Deposition: Sediment deposition with few/old point bars made up of coarse gravel.
Score: 16, 17 (16.5)
Channel Flow Status: Majority of stream filled with water (90-100%)
Score: 20, 15 (17.5)
Channel Alteration: No evidence of disturbance
Score: 18, 20 (19)
Channel Sinuosity: Run to bend ratio = 9
Score:14.5, 14.5 (14.5)
Bank Stability:
Left bank downstream: Little to no evidence of erosion
Score: 10, 9 (9.5)
Right bank downstream: Little to no evidence of erosion
Score: 10, 9 (9.5)
Bank Vegetative Protection:
Left bank downstream: 100% cover on streambank; waiting for tree strata to become more prominent, but all strata represented, no bare areas.
Score: 10, 10 (10)
Right bank downstream: 100% cover on streambank
Score: 10, 10 (10)
Riparian Vegetation Zone Width:
Left bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)
Right bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)

Kolomoki Mitigation Bank, Spring Creek Mitigation Area-Year 5
Habitat Assessment

Tributary ID: T2

Epifaunal Substrate/Available Cover: Habitat Types Present: Overhanging shrubbery, shallow/deep pools, macrophyte beds, thick root mats, large rocks, riffles with lots of turbulence over rocks, woody debris
Score: 18, 20 (19.0)
Pool Substrate Characterization: Clay, mud, gravel with submerged vegetation present, some sand.
Score: 13, 13 (13.0)
Pool Variability: Large and shallow, evenly mixed/small shallow below reaeration
Score: 5, 8 (6.5)
Sediment Deposition: Sediment deposition with few/old point bars made up of coarse gravel. Biggest point (old) near old road crossing.
Score: 16, 17 (16.5)
Channel Flow Status: Majority of stream filled with water (90-100%)
Score: 20, 16 (18)
Channel Alteration: No evidence of disturbance
Score: 18, 16 (17)
Channel Sinuosity: Run to bend ratio = 7
Score:16, 16 (16.0)
Bank Stability:
Left bank downstream: Little to no evidence of erosion (few game trails)
Score: 10, 9 (9.5)
Right bank downstream: Little to no evidence of erosion
Score: 10, 9 (9.5)
Bank Vegetative Protection:
Left bank downstream: 100% cover on streambank; waiting for tree strata to become more prominent, but all strata represented, no bare areas.
Score: 10, 10 (10)
Right bank downstream: 100% cover on streambank
Score: 10, 10 (10)
Riparian Vegetation Zone Width:
Left bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)
Right bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)

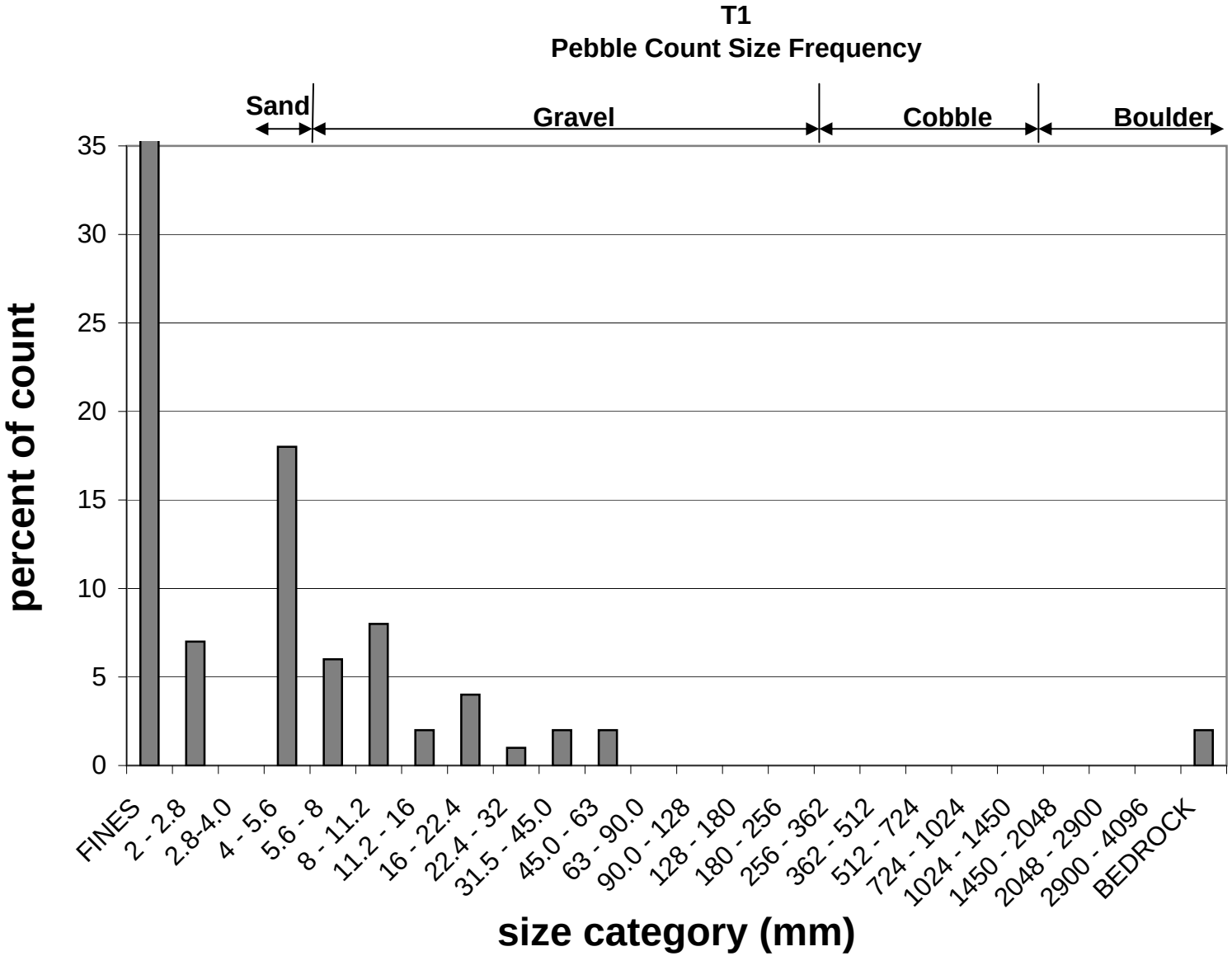
Kolomoki Mitigation Bank, Spring Creek Mitigation Area-Year 5
Habitat Assessment

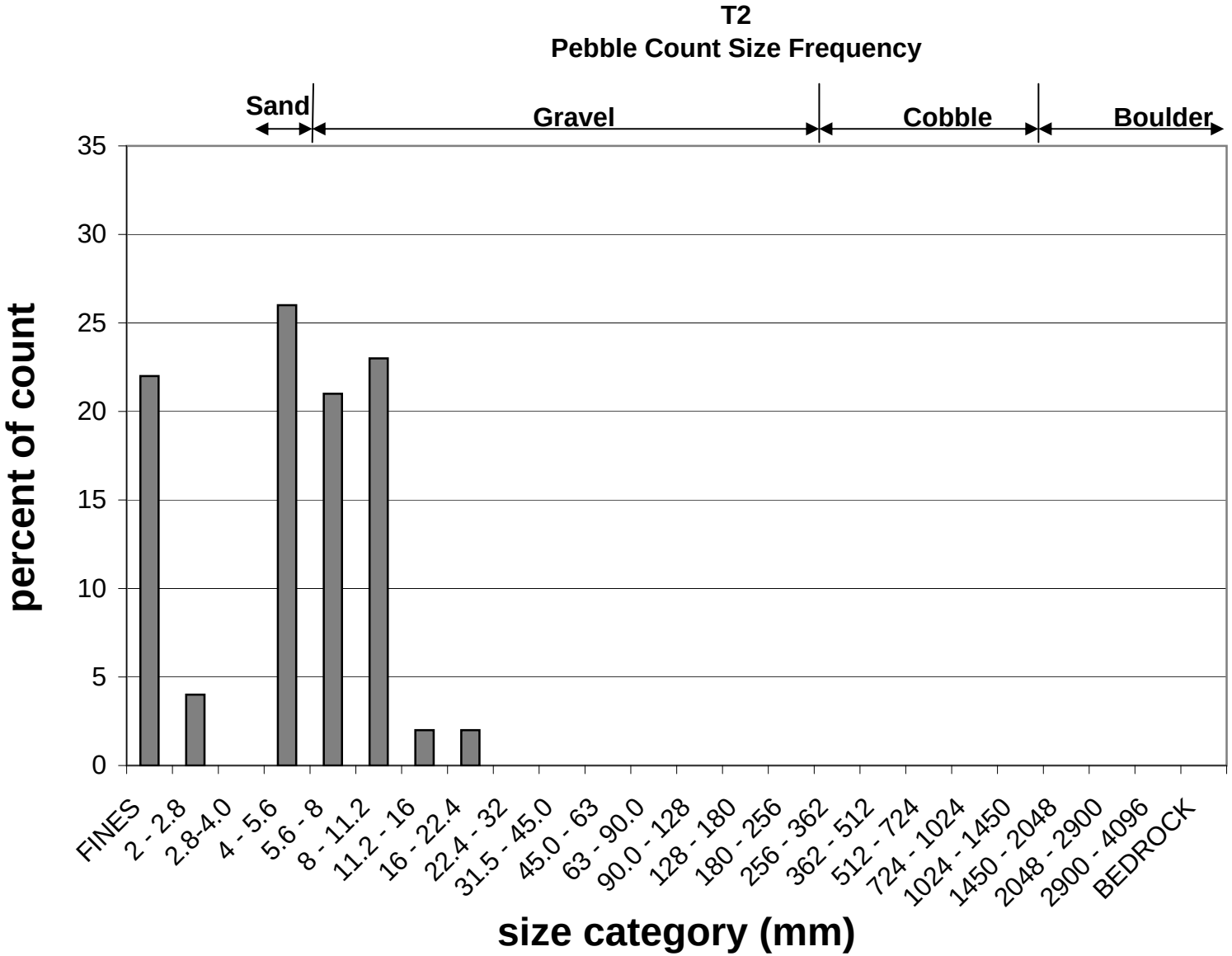
Tributary ID: T3

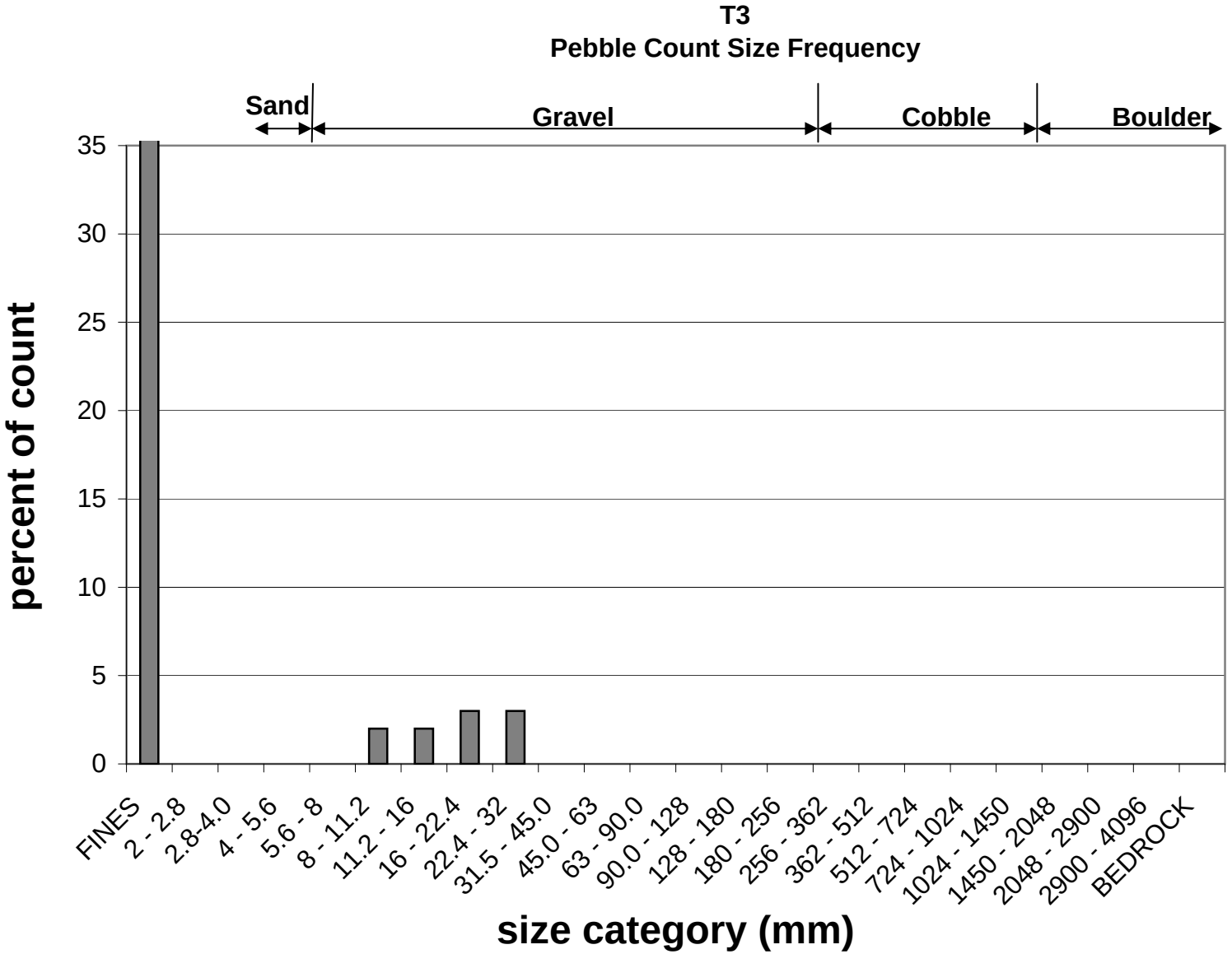
Epifaunal Substrate/Available Cover: Habitat Types Present: Overhanging shrubbery, large woody debris, macrophyte beds, thick root mats….flooding
Score: 17, 16 (16.5)
Pool Substrate Characterization: Firm sand, with root mats. Occasional gravel and bedrock.
Score: 13.5, 15 (14.25)
Pool Variability: Large and shallow, evenly mixed.
Score: 9, 6 (7.5)
Sediment Deposition: Sediment deposition with few/old point bars made up of coarse gravel.
Score: 18, 17 (17.5)
Channel Flow Status: 100% channel full….flooding)
Score: 20, 20 (20.0)
Channel Alteration: No evidence of disturbance
Score: 16, 16 (16)
Channel Sinuosity: Occasional bends
Score: 9.0, 10.0 (9.5)
Bank Stability:
Left bank downstream: Little to no evidence of erosion
Score: 9, 9 (9.0)
Right bank downstream: Little to no evidence of erosion
Score: 9, 9 (9.0)
Bank Vegetative Protection:
Left bank downstream: 100% cover on streambank; waiting for tree strata to become more prominent, but all strata represented, no bare areas.
Score: 8.5, 8 (8.25)
Right bank downstream: 100% cover on streambank
Score: 10, 10 (10)
Riparian Vegetation Zone Width:
Left bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)
Right bank downstream: Width of riparian zones greater than 18 meters, no breaks.
Score: 10, 10 (10)

APPENDIX G

ADDITIONAL STREAM DATA


T1
Pebble Count Size Frequency
Sand
Gravel
Cobble
Boulder
percent of count
0
5
10
15
20
25
30
35
FINES
2 - 2.8
2.8-4.0
4 - 5.6
5.6 - 8
8 - 11.2
11.2 - 16
16 - 22.4
22.4 - 32
31.5 - 45.0
45.0 - 63
63 - 90.0
90.0 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 724
724 - 1024
1024 - 1450
1450 - 2048
2048 - 2900
2900 - 4096
BEDROCK
size category (mm)


T2
Pebble Count Size Frequency
Sand
Gravel
Cobble
Boulder
percent of count
35
30
25
20
15
10
5
0
FINES
2 - 2.8
2.8-4.0
4 - 5.6
5.6 - 8
8 - 11.2
11.2 - 16
16 - 22.4
22.4 - 32
31.5 - 45.0
45.0 - 63
63 - 90.0
90.0 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 724
724 - 1024
1024 - 1450
1450 - 2048
2048 - 2900
2900 - 4096
BEDROCK
size category (mm)


T3
Pebble Count Size Frequency
Sand
Gravel
Cobble
Boulder
percent of count
35
30
25
20
15
10
5
0
FINES
2 - 2.8
2.8-4.0
4 - 5.6
5.6 - 8
8 - 11.2
11.2 - 16
16 - 22.4
22.4 - 32
31.5 - 45.0
45.0 - 63
63 - 90.0
90.0 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 724
724 - 1024
1024 - 1450
1450 - 2048
2048 - 2900
2900 - 4096
BEDROCK
size category (mm)